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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

RIOS CUEVAS, ROBERTO JOSE

ART UNIT PAPER NUMBER

2836

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/479,982

Applicant(s)

GAUDREAU ET AL.

Examiner

Roberto J Rios

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 35-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 35-60 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 16 July 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 34-59 have been renumbered 35-60. Moreover, applicant is required to correct claim dependency accordingly.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 35-39, 42-44, 46-51, 54-57 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood (US patent 4,511,815) in view of Nakamura et al (US patent 4,967,101).

As per claim 35, Wood teaches a modulator comprising: a transformer comprising a primary winding and a plurality of secondary windings, and a control driver for producing electrical control signals, said control driver being in electrical communication with said primary winding and being in electrical communication with a source of electrical power (Figure 4); and a plurality of switches (10), each switch

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having an input terminal pair and at least one output terminal pair, said input terminal pair being in electrical communication with a respective said transformer secondary winding (Figure 4); wherein the plurality of switches are substantially simultaneously switched on by a time varying electrical control on-pulse produced by said control driver, said on-pulse being substantially of a first polarity, and wherein the plurality of switches are substantially simultaneously switched off by a time varying electrical control off-pulse produced by said control driver, said off-pulse being substantially of a second polarity, said second polarity being opposite to said first polarity (col. 3, Line 7+). Wood does not specifically disclose each switch having an input voltage-limiting device in parallel with said input terminal pair providing a common defined voltage to each said switch. However, Nakamura et al (herein after Nakamura) teach a switch having an input voltage-limiting device in parallel with its input terminal pair providing a defined voltage to said switch (col. 1, line 39).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Wood's driving circuit with Nakamura's voltage limiting device for the purpose of limiting the control voltage so that this voltage will not become excessive.

As per claim 36, Wood teaches said transformer having a saturable ferromagnetic core. Moreover, it is important to note that ferromagnetic cores generally have high magnetic permeability exceeding a magnitude of one.

As per claim 37, Nakamura teaches the input voltage-limiting device comprising Zener devices (ZD1, ZD2).

As per claim 38, Wood teaches at least one of the plurality of switches comprising a MOSFET.

As per claim 39, Wood teaches the plurality of switches being serially connected (Figure 4).

As per claim 42, Wood teaches the on-pulse further comprising a succession of similar time varying electrical control pulses of said first polarity (Figure 2a).

As per claim 43, Wood teaches the off-pulse further comprising a succession of similar time varying electrical control pulses of said second polarity (Figure 2a).

As per claim 44, Wood teaches an output voltage limiting device bridging said output terminal pair, wherein said output voltage limiting device comprises Zener devices (40).

As per claim 46, Wood teaches the transformer comprising a primary winding but does not specifically disclose said primary winding comprising a distributed primary winding. However, the Examiner takes official notice that it is well known in the art to provide a transformer with a distributed primary winding.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Wood as a matter of engineering design choice such that said primary winding comprises a distributed primary winding for the purpose of reducing transformer leakage.

As per claim 47, Wood teaches a modulator comprising: a plurality of transformers comprising substantially a primary winding and a plurality of secondary windings; a plurality of retriggerable drive circuits (25) each having a buffer input

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terminal pair and a buffer output terminal pair, the buffer input terminal pair of each of the retriggerable drive circuits being in electrical communication with a respective member of the plurality of secondary windings; a plurality of switches (10), each switch associated with a respective retriggerable driver circuit and having an output terminal pair and an input terminal pair, the input terminal pair of each switch being in electrical communication with a respective buffer output terminal pair of the retriggerable drive circuit; and wherein each of the plurality of switches is substantially simultaneously switched on by a first electrical signal applied to the primary and remains substantially on until a second electrical signal is applied to the primary (col. 3, line 7+). Wood does not specifically disclose and having at least one input voltage limiting device in parallel with the buffer input terminal pair, said input voltage limiting device providing a common defined voltage to each said retriggerable drive circuit. However, Nakamura teaches a switch having an input voltage-limiting device in parallel with its input terminal pair providing a defined voltage to said switch (col. 1, line 39).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Wood's driving circuit with Nakamura's voltage limiting device for the purpose of limiting the control voltage so that this voltage will not become excessive.

As per claim 48, Wood teaches said transformer having a saturable ferromagnetic core. Moreover, it is important to note that ferromagnetic cores generally have high magnetic permeability exceeding a magnitude of one.

As per claim 49, Nakamura teaches the input voltage-limiting device comprising Zener devices (ZD1, ZD2).

As per claim 50, Wood teaches at least one of the plurality of switches comprising a MOSFET.

As per claim 51, Wood teaches the plurality of switches being serially connected (Figure 4).

As per claim 54, Wood teaches the retriggerable device circuit comprising a HEXFET IRF840. HEXFET 25 contains an integral reverse diode that acts as a series connected Zener diode.

As per claim 55, Wood teaches the retriggerable device circuit comprising a Zener device.

As per claim 56, Wood teaches said first and second signals being substantially different.

As per claim 57, Wood teaches an output voltage limiting device bridging said output terminal pair, wherein said output voltage limiting device comprises Zener devices (40).

As per claim 59, Wood teaches each secondary winding controlling a respective plurality of switches (Figure 4).

4. Claims 40, 41, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Gaudreau et al (US patent 5,646,833).

As per claims 40, 41, 52 and 53, Wood teaches serially connecting said switches but does not specifically disclose connecting said switches in parallel or series/parallel

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combination. However, Gaudreau et al (herein after Gaudreau) teach a high-power modulator, wherein full control of a load's voltage and current, including voltage modulation and regulation, and current interruption could be achieved by series, parallel or a combination of parallel-connected switches.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Wood with the teachings of Gaudreau such that the switches are selectively connected in series, parallel or series/parallel combination for the purpose of achieving full control of a load's voltage and current, including voltage modulation and regulation, and current interruption.

5. Claims 58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Nakamura, and further in view of Dassonville (US patent 4,370,607).

As per claims 58 and 60, Wood in view of Nakamura teaches the high-power modulator but does not specifically disclose the modulator comprising a stack of modulators sharing the primary of the transformer. However, Dassonville teaches a high-power modulator comprising a stack of modulators sharing the primary of the transformer (col. 1, line 39+).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Wood with the teachings of Dassonville such that the modulator comprises a stack of modulators sharing the primary of the transformer for the purpose of providing a miniaturized high-voltage switch.

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6. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Nakamura as applied to claim 35 above, and further in view of Bourgeois (US patent 5,469,041).

As per claim 45, Wood teaches providing a Zener device but does not specifically disclose the series connection of said Zener device with a resistor. However, Bourgeois teaches switching arrangement, wherein a switch is connected to a secondary winding of a transformer and a control voltage is applied to said switch through a series connection of a Zener device with a resistor.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Wood with the teachings of Bourgeois such that control voltage is applied to said switch through a series connection of the Zener device with a resistor for the purpose of limiting the charge current of said internal capacitance of the switch and determining the moment of switching in relation to the control voltage.

7. Art of general nature relating to high power modulators has been cited for applicant's review.

Response to Arguments

8. Applicant's arguments with respect to claims 35-60 have been considered but are moot in view of the new ground(s) of rejection.

Communication with PTO

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberto Rios whose telephone number is (703) 306-5518. In the event that Examiner Rios cannot be reached, his supervisor, Brian Sircus may be contacted at (703) 308-3119. The fax number for Before-Final communications and After-Final communications is (703) 872-9306.



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